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President. The task is a large one, but only a final act in the making of an American State. This convention was preceded by others held for various purposes and by each Nation and kind of people. At first statehood was opposed; then separate statehood desired, and, finally, the name of the new State arose for consideration.

The Indian Territory part of the new State is especially diverse in social conditions, containing the educated and illiterate of three species of people. From this cosmopolitan body the crucible of civilization is to reduce a citizenship. Graft, now prevalent, is to be supplanted by substantial credit and commercial honour. The white man is to rule, and the problem of the Indian is largely solved in his amalgamation. He has given his blood and a few strong traits to the new civilization. This was and is his destiny. The negro is to remain a problem in social, educational, and industrial matters.

Oklahoma Territory's history is in many respects similar to that of the Indian Territory. Most, but not all of its reservations have been opened to whites and improved. The most notable exception is the Osage Nation, which at this time contains many wealthy Indians, a few of whom remain in their blanket garb.

As regards resources, the Territories supplement each other, and are sure to become a great State. The trend of political matters is likely to be democratic, leaning towards the south. Educational interests are advancing in both Territories, with a thriving State University* at the head of the school system.

GEOGRAPHICAL RECORD.

AFRICA.

WHITE WOMEN ON THE CONGO.—The Fathers Superior of the Catholic Mission on the Congo have held a meeting at Leopoldville and submitted various suggestions to the Government, among which is one that is attracting special attention. The Fathers ask that, in the interest of the officials and agents of the State and of the State itself, the Government hereafter encourage its employees to bring their wives with them to the Congo. They say they are convinced that this policy will be to the advantage of the work of civilization and that the quality of the white personnel will thereby be improved. They also ask that the Government pay the expenses of conveying the wives of its employees to the Congo, and that no clause in the contracts with employees place any obstacle in the way of establishing family life among the servants of the Government in the Free State. They believe that this will evoke new sympathies for the work

* Dr. C. N. Gould, Professor of Geology in the University of Oklahoma, has made several trips in the Territory with the writer, and assisted very materially in the gathering of data for this paper.

on the Congo and will stimulate progress. It is evident that the enhanced comforts and conveniences of life in that country and the greatly-reduced mortality have suggested this policy, which has hitherto met with little favour.

LORD CROMER ON THE ANGLO-EGYPTIAN SUDAN.—Lord Cromer makes some important remarks about the Anglo-Egyptian Sudan in his last report. He says the most advanced part of the country has scarcely emerged from a state of barbarism. For a generation to come it will not be necessary to consider the adaptation of Western methods to this region. The most important political issue will probably be how slavery may be completely abolished without causing serious disorders. The people need, not national government, but good government. The country is about one-third as large as the continental United States, but only 1,576 square miles (an area not as large as that of Long Island) are cultivated. The remainder consists of desert, swamp, and primeval forest.

The area under cultivation increased from 704,872 acres in 1905 to 1,008,642 acres in 1906—a difference of 303,770 acres. This rate of increase is probably abnormal. It was due to the fact that, in most parts of the Sudan, heavy rains fell during the past year, with the result that the increase of cultivation of lands which depend for their water on rain was over 260,000 acres. The population is probably increasing, but, as nearly as can be ascertained, it is still a little under 2,000,000. According to the latest returns, there are 3,104 Europeans and 9,815 Abyssinians, Egyptians, and Indians in the country, making a total of 12,919 foreigners.

The demand for unskilled labour is far in excess of the supply and the rate of wages has risen considerably. The workshops at Khartum are beginning to turn out some young men with technical education, but this and other similar institutions are far too young adequately to meet the increasing requirements of the country. A good deal has been done towards establishing railroad communications. The line from Kereima to Abu Hamed has placed the province of Dongola in direct communication with the sea, while the more important line connecting Port Sudan and the Nile Valley has bridged over the space that formerly separated the Sudan from the outer world. The next step will be to open the territory known as the Ghezireh which lies between the Blue and the White Nile. With this object in view, provision has been made for the construction of a bridge over the Blue Nile from Halfaya to Khartum. When this work is completed a railroad will be constructed up the middle of the Ghezireh, with branches both to the Blue and the White Nile.

HANDBOOK FOR EAST AFRICA, UGANDA AND ZANZIBAR FOR 1907.—This annual, as usual, is filled with the latest information concerning the large area in eastern Africa to which it relates. More and more European settlers are taking up the unoccupied land in the elevated Kikuyu district, whose climate is somewhat similar to that of southern Europe. "One sees now at intervals European farmsteads with, here and there, rosy-faced children who bear witness to the suitability of the climate for Europeans." This statement is the more impressive because the region is only a little south of the equator. We are also informed that the export trade in European potatoes, over 1,200 tons in 1904, is on the increase, and that the plains of Masailand and Ulu are capable of great development in the way of cattle ranches. Labour in these districts is cheap and comparatively plentiful. At Machakos, in Ukamba province, apples, plums, and peaches are now raised. The good land nearest the Uganda railroad is naturally being taken up first. It is known that the quality of the wool of such

breeds of sheep as are raised in temperate zones deteriorates in very hot climates, but the handbook declares that the elevated lands of the East Africa Protectorate are well adapted for sheep-raising. The Turkana natives, to whom explorers have given a very bad reputation, prove, on closer acquaintance, not to be a treacherous and dangerous people, but are peaceful in every way and have themselves asked to be taken under the jurisdiction of the Europeans.

AMERICA.

NEW DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY.—Dr. George Otis Smith has entered upon his duties as Director of the U. S. Geological Survey. He was appointed by the President on the retirement of Mr. Walcott, now Secretary of the Smithsonian Institution. Dr. Smith has been engaged in geologic work for fourteen years, for a great part of the time as assistant geologist in the U. S. Geological Survey. His reports on the coal fields of the Pacific, the rocks of Mount Rainier, the geologic structure of the Tintic mining region, goldmining in central Washington, etc., have been published. Eventually, supervision of all the Survey's geologic work in New England was assigned to him and direction also of the geologic work in the areas of crystalline rocks in New Jersey, Pennsylvania, and Maryland. Last July he was appointed geologist in charge of petrology, with scientific supervision of the Survey work in that department.

Dr. Smith is a Fellow of the Geological Society of America, a Fellow of the American Association for the Advancement of Science, a member of the American Institute of Mining Engineers, of the American Forestry Association, and other scientific societies.

MINERAL RESOURCES OF THE UNITED STATES, 1905.—This is the twenty-second of the annual reports on the mineral resources of the country. Mr. David T. Day, Chief of the Division of Mining and Mineral Resources, says, in the introduction, that the object has always been to present annually a statement of the known mineral resources of the country and statistics of the production of these materials and the uses to which they are applied. The Government has no official information concerning the production of mineral substances excepting from the census reports or occasional studies of special mineral products. It was necessary, therefore, in order to collect annual estimates of the mineral products of the country, to enlist the co-operation of experts in each of the mineral industries. These experts are responsible for the subjects they treat. They have added to this work a vast volume of correspondence relating to the statistics of production. They have established a standard of accuracy and completeness in this annual that could have been otherwise secured only by long training of experts in the corps of the Geological Survey. Many of the experts have written their reports for many years, and usually for very small compensation, sufficient only to procure the clerical aid they need.

Among the leading reports in this volume are "Iron Ores," by John Birkinbine; "Gold and Silver," by Waldemar Lindgren and others, including special reports for each of the producing States and Territories; "Copper, Lead and Zinc," by Charles Kirchhoff; "Coal," by Edward W. Parker; "Natural Gas and Petroleum," by W. T. Griswold; "Precious Stones," by George F. Kunz.

Most of the papers in the volume and the statistical summary are issued at first as separate pamphlets.

THE U. S. GEOLOGICAL SURVEY AT THE JAMESTOWN EXPOSITION.—The exhibits of the Survey are under the direction of Mr. David T. Day. They include mounted geological maps from seventy of the Survey's Folios; special maps showing the distribution of economic mineral products east of the Rocky Mountains; minerals and ores whose distribution is shown on the maps, exhibited in an adjoining case; the new coloured geological map of North America (BULLETIN, 1906, p. 704); relief models illustrating the features and the economic resources of the southern Appalachian region, the New River Coal Field, and the Philadelphia region; a topographic model of the Atlanta-Chattanooga region; a topographic and geologic model of Alaska and a collection of Alaskan minerals. An especially interesting feature will be the educational series of rock specimens for teaching geology, each containing 156 specimens and of which 200 collections have now been distributed to Universities and Colleges. A complete set of the Survey publications will also be on file, and the best methods of arranging and storing the large number of maps and folios for convenient use in public and private libraries are shown.

EXTERMINATING MOSQUITOES IN STATEN ISLAND.—Dr. A. H. Doty, Health Officer of the Port of New York, who has carried on a campaign against the mosquitoes in the Borough of Richmond since 1901, has dug about 350 miles of ditches through the marsh lands, which are now perfectly dry. Meadow grass cut from them in 1906 and cured as hay was sold at \$10 a ton. In his opinion, the conditions under which the insects breed have been effectually removed.

RAILWAY MILEAGE IN THE UNITED STATES.—Mr. Slason Thompson has prepared a pamphlet of "Railway Statistics" for 1906 for the General Managers' Association of Chicago. Our railway mileage was 206,960. The latest European statistics show that the railway mileage in that continent is 178,999. In 1905, there were in operation in the United States 48,357 locomotives, 40,713 passenger cars, and 1,731,409 freight cars.

MANUAL OF THE GEOLOGY OF CONNECTICUT.—The State Geological and Natural History Survey of Connecticut has recently issued *Bulletin* No. 6, a volume of 273 pages, in which an outline is given of what is known of the geological structure and history of that State. The language of the volume is no more technical than is necessary, and the work will undoubtedly be useful to various classes of readers. Its authors are William North Rice, Superintendent of the Survey and Professor of Geology in Wesleyan University, and Herbert Ernest Gregory, Professor of Geology in Yale. Professor Rice contributes the first chapter, descriptive of the geography of Connecticut as related to geological structure and history. Chapter II, on the Crystalline Rocks, by Prof. Gregory, covers 116 pages. Chapter III, on the Triassic, 63 pages, is by Prof. Rice, and Prof. Gregory treats, in Chapter IV, Glacial Geology, including the work of the Great Glacier in Connecticut and the economic relations of glacial deposits. The work is especially designed for teachers of science in Connecticut, but students of geology in other regions will find in it a clear statement of the characteristic features of a small but interesting area. All intelligent readers, moreover, may learn much from this book of the character of the rock formations and of the agencies by which, in the course of ages, the surface of Connecticut has been moulded to its present form and condition.

TIMBER SUPPLY OF THE UNITED STATES.—In a paper on "The Timber Supply of the United States" (Forest Service, Circular 97), Mr. R. S. Kellogg gives many

facts to show that our present annual consumption of wood in all forms is from three to four times as great as the annual increment of our forests, and that it is of the utmost importance to take vigorous steps to insure a future supply of timber. If we take such steps, however, he thinks the outlook is by no means unpromising. The forest area of the country is sufficient, if rightly managed, to produce timber enough to supply every legitimate demand. He says there is no reason why our timber should not, some day, be brought up to the point of yielding an annual increment of more than 30 cubic feet per acre, which will supply the quantity of timber now consumed, and, if used economically, will be sufficient for a much larger population.

GLACIERS OF ALBERTA AND BRITISH COLUMBIA.—Messrs. George Vaux, Jr., and William S. Vaux spent the last two weeks of July, 1906, in the observation of glaciers of the Rocky Mountain and Selkirk Ranges near the Canadian Pacific Railroad, a subject to which the first-named gentleman had already given much attention. The results of their brief investigation are described in the *Proceedings* of the Academy of Natural Sciences, Philadelphia (Part 3, 1906). After treating in detail of the condition, last year, of the Illecillewaet, Asulkan, Wenkchemna, Victoria, Wapta, and Horseshoe Glaciers, the writers note that

in all these glaciers there has been decided shrinkage and recession in the past seven years. While changes in the position of the tongues of the glaciers may have been small, the ice mass and sectional area are evidently much less. On the other hand, the average yearly recession was, in 1906, less than during a similar period of five years before, the exception in the Illecillewaet Glacier being probably due to unusual conditions. The trifling advances in the Asulkan Glacier may be attributed to local causes and have no particular significance, but the increased daily rate of flow of the Illecillewaet, coupled with a thickening of the ice at the sky line as seen from the test rock, would seem to point to a period of greater activity in the not very distant future.

AUSTRALASIA.

THE SUGAR INDUSTRY OF QUEENSLAND.—The sugar-planters of Queensland have been much disturbed because of the new laws, which compel the Kanakas and South Sea Islanders who have furnished labour for the plantations of Eastern Australia to return to their homes in the Pacific. According to the *British Trade Journal*, there is no necessity for alarm. There appears to be no reason, climatic or otherwise, why white men cannot do all the work, as they have done in some places during the past two years. In 1905 Queensland produced 153,000 tons of sugar and 5,000,000 gallons of molasses. The total value of the crop, including by-products, was over eleven million dollars; so it appears that the industry is one of the greatest in Queensland. New South Wales produces about 20,000 tons of sugar yearly; and as the total consumption of sugar in Australia amounts to 185,000 tons, or 103 pounds per person, only 10,000 tons have to be imported.

E. H.

EUROPE.

HONOURS OF THE ROYAL GEOGRAPHICAL SOCIETY.—The Council of the Royal Geographical Society has awarded the Founder's Medal to Dr. Francisco Moreno, who has for twenty years been occupied in exploring South America, especially Patagonia and the Southern Andes, and the Patron's Medal to Dr. Roald Amundsen, the Norwegian explorer, who recently completed the north-west passage for the first time in a ship. The Murchison Bequest has been awarded to Captain G. E. Smith for his various important surveys in British East Africa; the Gill Memorial to Mr. C. Raymond Beazley for his work in

three volumes on "The Dawn of Modern Geography," the result of many years' research; the Back Bequest to Mr. C. E. Moss for his important researches on the geographical distribution of vegetation in England; and the Cuthbert Peek Fund to Major C. W. Gwynn, C.M.G., D.S.O., R.E., for the important geographical and cartographical work which he carried out in the Blue Nile region and on the proposed Sudan-Abyssinian frontier.

HONOURS OF THE PARIS GEOGRAPHICAL SOCIETY.—The chief honours for the past year have been awarded to Mr. René Chudeau for his journey across the Sahara and the Sudan; to Captain Larras for his itineraries in Morocco; to the Marquis de Segonzac for his explorations in Morocco; to Mr. Pierre Prins for his itineraries in Dar Fertit and on the upper Kotto; and to Mr. Paul Lemoine for his geological studies in the northern Sahara.

GEIKIE'S TRIBUTE TO RICHTHOFEN.—Sir Archibald Geikie has written in the *Proceedings* of the Royal Society an interesting article on the late Baron von Richthofen. Its description of the methods that master employed in educational geography will interest many American geographers. An extract appears below. Richthofen was called to the Chair of Geography in the University of Berlin in 1886:

"There he threw himself with all his characteristic originality and ardour into the task of devising and arranging such illustrations of geography as would bring vividly before the eyes and minds of his students, and of the general public, the characteristic features of land and sea, and the appliances for scientific exploration and travel. In connection with the University a Geographical Institute was organized by him, in which these various collections were arranged, and where ample space was found for large and small lecture rooms, map-drawing rooms; survey-practice rooms, a reference library and large reading room, well furnished with current geographical literature in all languages. In his later years he gave special attention to the illustration of the sea and succeeded in prevailing upon the authorities to build a Museum for Oceanography ('Meereskunde'), in which he sought to display, by help of charts, maps, models, paintings; diagrams and apparatus, every feature of the sea which is capable of such illustration. Nor did he confine his efforts to a strictly scientific field: all that could help to convey a practical sense of the work of navigation and exploration or quicken the popular interest in the navy came within the scope of his aims. He journeyed through the maritime countries of Europe in search of the best examples of illustration for his purpose—models of ships of all ages, methods of shipbuilding, and types of instruments employed in navigation. For spaciousness, and even luxuriousness of accommodation, for breadth of conception, and for the completeness with which the designs have been carried out, there is probably no geographical establishment in the world that can equal the Geographical Institute of Berlin, planned and carried out by the genius and unwearied enthusiasm of its Director.

"Beginning his career with geological studies in the field, Baron von Richthofen passed into geographical investigation with the inestimable advantage of a training in detailed observation and induction. He thus became a geographer of the highest type. To him the mere addition of so many hundred square miles of territory to what was already known of the earth's surface, and the opportunity of affixing the names of friends and benefactors to peaks, promontories, rivers and inlets, were matters of no moment; it was the grand features of land and sea that interested him—their origin, their history, their relations to

each other, their influence on the progress and destiny of mankind. His geological apprenticeship with the Austrian surveyors among the Eastern Alps, and his early researches in mountain-structure and the behaviour of igneous rocks, could hardly fail to give him that grasp of physical features, combined with that knowledge of detail which are so often lacking in travellers and explorers. But besides his scientific accomplishments he possessed in rare measure the personal qualities which go so far to ensure the success of an explorer—health and strength alike of body and mind, a wide range of natural knowledge, courage, patience, endurance, tact, and kindliness. It may have been the consciousness of the possession of these qualities, combined with a recollection of the pleasure their exercise had given him in his varied wanderings in Europe, America, and Asia, that led him, in response to many requests, to give a course of popular lectures on scientific travel. These lectures he subsequently extended; and in 1886, the year of his transference to Berlin, amidst all his University and other work, they appeared as his admirable *Führer für Forschungsreisende*. No one but a born and trained explorer, who had enjoyed ample experience by flood and fell all over the globe, could have written such a volume—so full of the ripest practical knowledge, so broad in its conception of what exploration should be, and so clear and emphatic in its statement of the accomplishments which are needed for the making of a successful traveller. Every department of research is luminously presented in his chapters, which may be regarded as a contribution of the first importance to geology and physical geography. Among the shrewd pieces of advice in the book the author recommends the explorer to travel alone, with only the attendants necessary for his purpose, but without any friend or companion who would do more than look after the material well-being of the expedition. Various treatises with similar aims had been given to the world before the publication of Richthofen's volume, from the time of Ami Boué's '*Guide du Géologue Voyageur*' onwards, but none of them so thoroughly deserves to be put into the hands of every man who proposes to undertake the examination of new or little-known regions, and who is willing to learn beforehand what is expected of him by those competent to judge."

OCEANIA.

THE IRRIGATION SYSTEM OF HAWAII.—The recent growth of the population of Hawaii has been so rapid that the islands have almost reached the limit of productivity. Further outlay upon improvements in agriculture, the one great industry, does not produce a commensurate increase in crops, and Malthus' law of diminishing returns begins to apply. Part of the recent growth has been made possible by a peculiar system of irrigation. For ten months out of twelve, as is well known, the tradewinds blow steadily upon the northeast side of the islands. The height to which the air must rise in getting over the volcanic mountains from 3,000 to 14,000 feet high causes enormous precipitation on the windward side; while the lee side, where the winds descend and grow warm, is comparatively arid. Hon. L. A. Thurston, Chairman of the Board of Agriculture and Forestry of Hawaii, in a recent address at the annual meeting of the American Forestry Association, mentions one instance on the main island of Hawaii, where in 1904 the rainfall of a place on the windward side of the mountains amounted to 420 inches, while that of another on the leeward side only 40 miles away was but 10 inches. Under such conditions it was to be expected that, with the growth of population and the introduction of the present highly-

intensive methods of agriculture, an irrigation system should be constructed to carry the superabundant water of the moist side to the arid regions a few miles to leeward. This has been done within a few years, and now on the windward side of the mountains there are 207 reservoirs with a capacity of eight billion gallons (equal to that of a lake with an area of four square miles and a depth of ten feet). From the reservoirs fifteen aqueducts, with a length of about 40 miles and a daily capacity of 600,000,000 gallons (equal to half an inch of rain-fall over 70 square miles), "contour" around the mountains from the wet side to the dry. The land thus irrigated is enormously productive; for the volcanic soil of the islands is very rich, and the ideal conditions of abundant sunshine, steady but not excessive warmth, and plentiful water prevail. It is not possible, however, to irrigate all of the dry leeward slopes from the torrential rains of the other side. Fortunately, it has been found that in artesian wells water rises to a height of from 10 to 42 feet above sea-level, even in dry regions. Accordingly, in Oahu, the island where Honolulu is located, some 600 wells have been bored with an average diameter of 10 inches and an average depth of 450 feet, the deepest being 1,100 feet. From these wells nearly 600,000 gallons can be pumped daily by 110 big pumping plants. Some of the water is lifted to a height of 450 feet, and much of the 600 square miles of the island is now irrigated. Further irrigation has now become an expensive matter. Hence, in the future, Hawaii cannot maintain the phenomenal rate of development of the past decade.

E. H.

POLAR.

THE WELLMAN AIRSHIP EXPEDITION.—Reuter despatches say that the steamer *Frithjof* is expected to leave Tromsø for Spitzbergen, on June 1, with the Wellman Expedition. The party will consist of about 35 men. It will go to the expedition base at Danes Island, established last year, where three men are now living. Mr. Mallet, the well-known airship constructor of Paris, has reconstructed the balloon part of the airship *America*. The ship is now 183.14 feet in length, and its greatest diameter is 52.3 feet. Its volume is 265,000 cubic feet, and when inflated it will have a lifting force of 19,500 lb. A new steel car and mechanical equipment have been built in the Expedition's own workshops at Gennevilliers, a suburb of Paris, under the direction of Mr. Wellman and his chief engineer. The car, very light and strong, made of steel tubing, is 115 feet long. A steel reservoir contains 6,800 pounds of petrol for the motors, the principal motor working directly on two steel screws 11.5 feet in diameter. The proper speed of the airship is 16-18 miles an hour, and the fuel to be carried will give 150 hours of motoring at full speed. It is estimated that with the fuel provided the airship may travel over 2,250 miles, or nearly double the distance from Spitzbergen to the Pole and back again. Trials of the ship will be made at Spitzbergen before attempting the voyage to the Pole.

In addition to motors, machinery, nearly three and a half tons of petrol, a crew of four or five men, a dozen sledge dogs and a complete sledging outfit for a possible return over the ice, the *America* will carry a ton and a half of food, making it possible to spend a winter in the Arctic if necessary. It is planned to have trials of the airship in Spitzbergen in July and to start for the Pole in the latter part of that month or early in August.

VARIOUS.

AVERAGE DATES OF FIRST AND LAST FROST.—The average dates of first and last frost, and the average number of days without frost, are data whose im-

portance in climatology has long been recognized, and climatological tables which are in any way complete always include information on these points. For the United States, for example, we have had for some years charts showing the average dates of first and last frost. Such charts were published in the *Yearbook of the Department of Agriculture for 1897*; in Greely's "*American Weather*;" and, the latest ones, in Henry's "*Climatology of the United States*" (Bulletin Q, U. S. Weather Bureau, 1906). Up to the present time, however, no one has attempted to draw lines of first and last frost occurrence, and of the duration of frost, for the whole world. This study has now been undertaken by Otto Dorscheid, of Halle, who, in the *Meteorologische Zeitschrift* for January and February, 1907, presents a paper "*Die mittlere Dauer des Frostes auf der Erde*," in which are included three charts, showing respectively the lines of simultaneous occurrence of first frost, last frost, and the lines of equal duration of frost for the northern hemisphere. While the actual occurrence of frost in any individual year may, and does often, depart very considerably from the average date, nevertheless such lines are of considerable interest and importance in all studies of climate. These charts are, therefore, a distinct contribution to climatology.

The average dates of occurrence of first frost at different latitudes and longitudes, as given on Dorscheid's first chart, are shown in the following table, in which the months are indicated by Roman numerals:

LATI- TUDÉ.	EUROPE.		ASIA.						AMERICA.				
	10° E.	40° E.	70° E.	100° E.	130° E.	160° E.	170° W.	140° W.	110° W.	80° W.	50° W.		
70°....	17. XI	4. X	9. IX	9. IX	20. IX	14. IX	10. IX	10. IX	11. IX	9. IX	15. IX		
60°....	17. XII	24. X	12. X	4. X	4. X	7. X	6. X	15. XI	15. X	7. X	19. X		
50°....	15. XII	18. XI	28. X	24. X	17. X	1. I	15. I	—	4. XI	3. XI	5. XII		
40°....	—	—	9. I	30. XI	5. XII	—	—	—	17. XII	15. I	—		

It appears that from the west coasts towards the middle of the continents, along the same parallel of latitude, frost comes earlier, and from the interiors to the east coasts a gradual retardation is noted. The same chart shows in a very striking manner the effect of cold or warm ocean currents upon the frost conditions of a country.

The average dates of last frost are shown in the following table:

LATI- TUDE.	EUROPE.		ASIA.						AMERICA.			
	10° E.	40° E.	70° E.	100° E.	130° E.	160° E.	170° W.	140° W.	110° W.	80° W.	50° W.	
70°....	5. V	12. V	17. VI	6. VI	5. VI	27. VI	20. VI	6. VI	3. VI	5. VI	23. V	
60°....	1. IV	10. IV	2. V	28. IV	6. V	5. V	8. V	15. III	1. V	23. V	16. IV	
50°....	6. II	21. III	4. IV	7. IV	14. IV	1. II	15. II	—	24. III	22. IV	1. IV	
40°....	—	—	6. II	28. II	24. II	—	—	—	1. III	1. II	—	

This table shows that the disappearance of frost over the continents is much retarded from the coasts towards the interiors. The following table gives, in compact form, the average number of days with frost at different latitudes and longitudes in Europe, Asia and America:

LATI- TUDÉ.	EUROPE.		ASIA.						AMERICA.			
	10° E.	40° E.	70° E.	100° E.	130° E.	160° E.	170° W.	140° W.	110° W.	80° W.	50° W.	
70°....	150	232	283	265	254	260	290	270	267	277	240	
60°....	130	168	203	210	213	209	200	100	195	241	175	
50°....	43	130	161	167	177	120	20	—	142	171	140	
40°....	—	—	68	95	64	—	—	—	55	20	—	

A careful study of the polar limits of trees in relation to his frost charts brings Dorscheid to the conclusion that these limits are principally determined by an excessive duration of frost—i. e., by a shortening to less than 100 days of the time with temperatures above freezing. In this investigation the polar limits of trees were taken, in a large way, as the limits of forests.

R. DEC. W.

CHANGES OF CLIMATE.—Apropos of the evidence which Mr. Ellsworth Huntington has lately brought forward from central Asia, of climatic changes or alterations during the last 2,000 or more years, Professor Cleveland Abbe (*Monthly Weather Review*, Dec., 1906) says: "We may in general conclude that in the present state of the globe and the atmosphere, and without any change in latitude or altitude, moisture, or sunshine, it is perfectly possible for such combinations of winds to occur as to give us in one century conditions favourable for rain, snow, and glaciers, but in another distant century drought, sand and desert. These alternations depend essentially upon extreme variations in what is called the general circulation of the atmosphere; they are perturbations produced by its own internal mechanism."

R. DEC. W.

FOREST PRESERVATION.—In his address elsewhere referred to Mr. Thurston emphasized the necessity of forest reserves in Hawaii. Formerly forests covered the untillable mountain slopes from the sea to a height of 6,000 feet, but of late mills have been operated on all four of the larger islands; and the cutting has increased so that, in places, the mountains are almost denuded up to an elevation of 2,000 or 3,000 feet above sea-level. The enormous possibilities of destruction by floods and of loss to irrigation if forests are cut off in a land of such steep slopes and heavy rainfall as Hawaii is evident from such facts as the following: On the slope of a mountain 1,370 feet high on the main island 84 inches of rain fell during the month of February, 1904; but within three days after the cessation of rain no running water remained on the mountain side. All had rushed to the sea in violent floods and none remained for irrigation. The sugar-planters realize the dangers of deforestation so keenly that they have not only segregated 150,000 acres of their own land as a forest reserve in addition to the 150,000 set apart by the state, but have agreed, under contract in some cases, to help the Government in reforesting public lands at private expense.

The problem of Hawaii is the same as that of the United States and China. The Merrimac River, for instance, according to the statement of Mr. G. W. Cook in an address before the Forestry Association, though only 110 miles long, turns more spindles and furnishes employment to more people than any other river on earth. The prosperity and happiness of the people along its banks depend upon the steadiness of the water-supply which comes from the White Mountains. During the last two decades the forests of that region have been cut so rapidly that the river is becoming erratic. Twice during the last fifteen years the towns along its banks have suffered from the highest floods ever known, because at times of exceptional precipitation the water is not held back, as it was formerly, by the roots and matted mulch of forests. Between the time of high water there have been periods of unusual drought, and hence of further injury to industry, which would not have occurred if the forests had remained. All parts of the country are suffering likewise. In the Ohio Valley, for instance, the floods in January, 1907, threw 10,000 miners out of work along the Monongahela River, and 3,000 mill-hands were obliged to be idle for a

few days in a neighbouring region. Hundreds of families were forced to live upstairs and to keep skiffs in readiness to take them away if the water rose higher. If the forests had not been recklessly cut, the flood could never have attained such great dimensions. Hence the urgent necessity for the passage by Congress of the bill before the present session for the establishment of forest reserves in the White Mountains and in the Appalachians. The present famine in China is an instructive lesson as to the dangers of deforestation. For centuries the highlands of western China at the head of the Hoang-Ho have been devoid of trees. Therefore, dire floods cause widespread famines, which not only entail untold suffering in China, but demand contributions from the rest of the world. The lack of trees in western China may be due to the deprivations of man, or of flocks, or to climatic conditions. Whatever its cause may be, it is clear that if the mountains of China were well covered with forests the existing famine, with its tendency to cause disorder, emigration, and an unknown string of consequences, would not attain more than a small part of its present severity. China should serve as a timely warning to America.

E. H.

METHODS OF EXPRESSING TOPOGRAPHIC RELIEF.—Col. C. W. Larned, of the U. S. Military Academy, has begun the publication in the *Journal of the Military Service Institution* (May, 1907) of papers entitled "History of Map Making and Topography." Speaking of the two general methods of expressing topographic relief (1) by means of hachures and (2) by contour lines, he says that the latter system is gradually displacing the former. Hachures have the great disadvantage of possessing no exact scale of heights, and, furthermore, they obscure the map by the intrusion of a large number of shading lines which tend to confuse the expression of culture.

The contour system, on the other hand, may equally well be made the basis of an artificial shading applied as a wash or by rubbing with some shading medium of sufficient delicacy not to obscure either the contours or culture. This method of auxiliary shading has been adopted in the latest maps of the General Staff of France.

The maps of the U. S. Geological Survey are excellent examples of the simple contour system and of the very satisfactory expression of relief produced by it in most forms of orography.

The author believes that before very long the leading Governments of the world will adopt standard conventions and methods for the production of maps.

THE TRADE OF 1906.—The Tariff Commission of Great Britain has recently published a Memorandum showing the increase of the trade of 1906 over that of 1905 in the United Kingdom, Germany, France, and the United States. The figures, in millions of pounds sterling, appear below:

	IMPORTS FOR HOME CONSUMPTION.			EXPORTS.			TOTAL TRADE.		
	1905. £	1906. £	inc. p. c.	1905. £	1906. £	inc. p. c.	1905. £	1906. £	inc. p. c.
United Kingdom.....	487.	523.	7.4	330.	376.	13.6	817.	899.	10.0
Germany.....	336½.	386.	14.9	279.	306.	9.7	615.	692.	12.5
France.....	187.	204.	9.1	190.	200.	5.3	377.	404.	7.2
U. S. A.....	237.	262.	10.0	329.	369.	12.2	566.	631.	11.1

These figures represent only the increase in the money value of the articles imported and exported. In order to obtain a correct view of the course of trade in 1906, it is necessary to take into account the fact that prices have been steadily advancing. According to calculations by Mr. Sauerbeck, the rise in the wholesale price of the forty-five principal articles forming 90 per cent. of the total volume of trade amounted to 6.8 per cent. in Great Britain. Thus it appears that the increase in the quantity of articles of trade is much less than the increase in value. Statistics as to the rise of prices are not available for other countries.

E. H.

DR. SIGMUND GÜNTHER, of Munich, has an able paper in the *Jahresbericht* of the Frankfort Geographical and Statistical Society on the progress of geographical knowledge in the past ten years.

THE GEOGRAPHICAL SOCIETY OF LÜBECK celebrates the first quarter of a century of its existence (1882-1907) with a pamphlet giving the history of the Society, including an account of its scientific work, notices of its lecture courses and publications and lists of its honorary and regular members and exchanges. The Society has been especially active in the study of the topography and geology of Lübeck and the surrounding regions.

COMMANDANT LEMAIRE, well known for his scientific surveys in the Congo Free State, delivered an illustrated lecture entitled "Across Central Africa" in September last before the Second Universal Congress of Esperanto in Geneva. The text and illustrations have been reproduced in a handsome quarto, and Commandant Lemaire has sent a copy to the Society. The text is given both in French and Esperanto, and the frontispiece is a photograph of the distinguished explorer.

A MONUMENT to the memory of August Petermann, the founder of the *Mitteilungen*, is to be erected in the Grand Duke's Park, in Gotha, which was the scene of most of his work.

THE BRETHREN PUBLISHING HOUSE of Elgin, Ill., has issued a fifth edition of 10,000 copies of a book entitled "The Other Half of The World," in which one of its missionaries describes a tour of 65,400 miles which he made while visiting the stations of the Society. The peculiarity of the enterprise is that the book is not for sale, but is given to those who subscribe for the missionary publication of the Society.

The Board of Trade Journal (No. 539, 1907) prints lists of the treaty ports and places open to foreign trade in China, Japan, and Corea. They embrace 81 places in China, including the ports of call on the Yangtse and West rivers; 22 in Japan, including Formosa and the Pescadores, and 13 in Corea.

OBITUARY.

M. QUARRÉ-REYBOURBON, Vice-President of the Lille Geographical Society, is dead at the age of 82. He had long been active in promoting the work of the Society.